

Histomorphometric changes in repaired mouse sciatic nerves are unaffected by the application of a scar-reducing agent

Abstract

Microsurgical repair of transected peripheral nerves is compromised by the formation of scar tissue and the development of a neuroma, thereby limiting the success of regeneration. The aim of this study was to quantify histomorphometrically the structural changes in neural tissue that result from repair, and determine the effect of mannose-6-phosphate (M6P), a scar-reducing agent previously shown to enhance regeneration. In anaesthetised C57-black-6 mice, the left sciatic nerve was sectioned and repaired using four epineurial sutures. Either 100 μ L of 600 mM M6P (five animals) or 100 μ L of phosphate-buffered saline (placebo controls, five animals) was injected into and around the nerve repair site. A further group acted as sham-operated controls. After recovery for 6 weeks, the nerve was harvested for analysis using light and electron microscopy. Analysis revealed that when compared with sham controls, myelinated axons had smaller diameters both proximal and distal to the repair. Myelinated axon counts, axonal density and size all decreased across the repair site. There were normal numbers and densities of non-myelinated axons both proximal and distal to the repair. However, there were more Remak bundles distal to the repair site, and fewer non-myelinated axons per Remak bundle. Application of M6P did not affect any of these parameters.

Authors:	Ngeow, W. C.
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